

Appl. No. 10/582,297Docket: 15447NP

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A method of controlling the displacements of a moving portion of a multi-axis robot along a path, ~~the method being characterized in that it comprises the steps consisting in~~ comprising:

- providing movement instructions  $[(300)]$  to a path generator  $[(400)]$ , the instructions including at least information relating to the shape of the path  $[(320)]$  and to force setpoints  $[(310)]$ ;

- calculating an external force signal  $[(800)]$  representing at least one component of the force  $[(F)]$  exerted by said moving portion  $[(0)]$  on its environment;

- acting at a predetermined sampling frequency to provide said external force signal  $[(800)]$  to said path generator  $[(400)]$ ;

- calculating, with said path generator  $[(400)]$  and at a predetermined sampling frequency, movement setpoints  $[(500)]$  along said path  $[(320)]$  in such a manner as to minimize the difference between the projection  $[(FT)]$  of the external force

onto the tangent  $[(T)]$  of the path and the projection of the force setpoint onto said tangent; and

· delivering said movement setpoints  $[(500)]$  to a servo-control means ~~(601-606)~~ enabling at least one axis of said robot  $[(600)]$  to be set into movement in compliance with said movement setpoints  $[(500)]$ .

2. (Currently Amended)  $[[A]]$  The method according to claim 1, ~~characterized in that~~ wherein said external force signal  $[(800)]$  is calculated from information representing the current flowing in at least one actuator ~~(601-606)~~ of said robot  $[(600)]$ .

3. (Currently Amended)  $[[A]]$  The method according to claim 1, ~~characterized in that it includes a step consisting in~~ including using a dynamic model  $[(712)]$  of said robot  $[(600)]$  while calculating said external force signal  $[(800)]$ .

4. (Currently Amended)  $[[A]]$  The method according to claim 1, ~~characterized in that it includes a step consisting in~~ including supplying said path generator  $[(400)]$  with at least one velocity limit value  $[(330)]$  and/or at least one acceleration limit value  $[(340)]$  for taking into account while calculating

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said movement setpoints  $[(500)]$ , such that said setpoints comply with said limit value(s).

5. (Currently Amended) Apparatus for controlling the displacements of a moving portion of a multi-axis robot along a path, ~~the apparatus being characterized in that it comprises~~  
comprising:

- a path generator  $[(400)]$  suitable for calculating movement setpoints  $[(500)]$  as a function of movement instructions  $[(300)]$  including at least information relating to the shape of the path  $[(320)]$  and to its force setpoints  $[(310)]$ ; and

- a force estimator  $[(700)]$  suitable for generating an external force signal  $[(800)]$  representing at least one component of the force  $[(F)]$  exerted by said moving portion  $[(0)]$  on its environment and for delivering said signal to said path generator at a predetermined sampling frequency, where said path generator is suitable for calculating said movement setpoints  $[(500)]$  along said path  $[(320)]$  at a predetermined sampling frequency in such a manner as to minimize the difference between the projection  $[(FT)]$  of the external force on the tangent  $[(T)]$  to the path and the projection of the force setpoint onto said tangent, said movement setpoints  $[(500)]$

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being delivered to a servo-control means ~~(601-606)~~ enabling at least one axis of said robot ~~[[600]]~~ to be set into movement.

6. (Currently Amended) ~~Apparatus~~ The apparatus according to claim 5, ~~characterized in that it comprises~~ further including a program interpreter means ~~[[200]]~~ suitable for executing programs containing movement instructions ~~[[300]]~~ enabling at least the shape of the path ~~[[320]]~~ and force setpoints ~~[[310]]~~ to be specified.